

	Ice thickness	Increase	Monthly Mean Temp. F.
December 20	4 feet 7 inches ...	-	-24° below zero
1854			
January 24	5 feet 9 inches ... 14 in 35 days	-30° 6 "	" "
February 25	7 feet 3 inches ... 16 in 32 days	-34° 9 "	" "
April 25	8 feet 1/2 inch ... 12 in 59 days	-8° 5 "	" "
May 25	8 feet 1/2 inch ... none 30 days	+24° above zero	

The above table shows that the ice ceased to increase in thickness some time between April 25 and May 25, after which it decreased rapidly; but I was unable to decide what proportion of this decrease was due to thaw and evaporation from the surface, and what amount from the lower part of the floe that was under water: no doubt by far the greater effect was produced by the two first causes.

Eight feet may perhaps be considered a fair or rather a high average of one winter's formation of new ice (not increase of an old floe) over the whole of the Arctic Sea, because Repulse Bay, although in a comparatively low latitude, was particularly favourable for ice-formation, there being no currents of any consequence. Where there are currents, one year's ice does not exceed three or four feet.

The winter's ice of 1875-6 at Discovery Bay, in latitude 81° 40' N., did not exceed, if I remember correctly, six feet in thickness.

Even were these great compound floes, called Palaeocrystic ice, found at or near the Pole, and of only the same thickness as those seen at Grinnell Land—instead of "hundreds of feet"—they would not probably have nearly so low an average temperature all the year round as 20° F. below the freezing-point of water, because only one-sixth of their mass would be exposed to very low temperatures for about six months of the year, the surface being during that time protected by a more or less thick covering of snow, whilst at least five-sixths of their bulk was under water, having a temperature for the whole twelve months at or above the freezing-point of the sea. The question is, how far the very low temperatures of an Arctic winter do penetrate a mass of, say sixty feet of ice, the surface of which is covered with a foot of snow, and fifty feet or five-sixths under water of a temperature at or above the freezing-point of the sea?

From my experience on a much smaller scale, I do not believe that the atmospheric cold would, under the circumstances mentioned, penetrate to the lower surface of ice sixty feet thick; and if it does not do so there would be no increase to its thickness during winter.<sup>2</sup>

An excellent example of formation of Palaeocrystic ice, or floe-berg is afforded by the experience of the Austro-Hungarian Expedition under Weyprecht and Payer in the Barentz Sea in 1873-4. Their ship was lifted high out of the water by the pressure of the floes, which were forced over and under each other to a great thickness and extent in a very few days.

The ship and her crew were helplessly drifted about for many months, during which the floes were frozen together into one solid mass, and the inequalities of the surface in a great measure filled up with snow-drift.

JOHN RAE

4, Addison Gardens, January 29

#### On the Spectrum of Carbon

IN addressing to you my former letter regarding Dr. Watts's experiments on the spectrum of carbon, it was not my intention to enter on any discussion concerning matters of opinion. The reference made in that letter to the difficulty of perfectly drying a gas so as to eliminate the ultra-violet spectrum of water had reference to gases at ordinary atmospheric pressure; and the expectation a gas will be dried "to all intents and purposes" by the use of a U-tube of phosphoric anhydride goes far to explain the origin of different experimental results. The cogent experimental evidence which Dr. Watts justly demands may, so far as the relations of carbon and nitrogen are concerned, be found in our complete papers on the spectrum of carbon compounds in the *Proceedings of the Royal Society*.

The supposition, which appears to be a difficulty to Dr. Watts's mind, that traces of nitrogen in hydrocarbons give with the spark the spectrum of nitrocarbons, and that traces of hydrogen in cyanogen give the hydrocarbon spectrum, is not only "reasonable,"

<sup>1</sup> The mean temperature opposite to April is that of March and April combined, and it will be seen that the average increase of ice for each of these months is only 6½ inches.

<sup>2</sup> That the sea raises the temperature of the ice on its surface even in very cold weather, is evinced by the fact that a snow hut built on the ice is warmer than if built on the land.

but appears to me most consistent with the spectrum observations on the whole, and with the chemical regarding the formation and relations of acetylene and hydrocyanic acid.

Cambridge, January 22

G. D. LIVEING

#### Vibration of Telegraph Wires During Frost

MR. T. M. READE asks for an explanation of this phenomenon. In *Science Gossip* for 1874, p. 254, there is a short article of mine on "Frost Phenomena," and one of those referred to is this curious vibration of telegraph wires.

The explanation there suggested, which was only a guess, is probably incorrect; but I think I can give the true one now, and it is, as usual in such cases, extremely simple.

Hoar frost is only deposited in air which is nearly at rest; a strong wind shakes it down as it forms. But there is nearly always a slight air-current in one definite direction, and the ice spicules are built up "in the teeth" of this current, that is on the windward side of the wire or twig.

They always point towards the wind. When they have attained a length of, say, half an inch, if the direction of the air-current slightly changes, it may strike the comb-like fringe no longer on the points, but on the side, and, obtaining thus a leverage upon the wire, will twist it round till the pressure is balanced by the torsion. If the pressure were absolutely constant the wire would perhaps remain in this position, but the very slightest variation of pressure would set up a vibratory motion, and this, I think, must be the true cause of the phenomenon.

Birstal Hill, Leicester, February 5

F. T. MOTT

#### The Star Oeltzen, 17681

THE star Oeltzen, 17681, whose spectrum was announced by me to consist mainly of a yellow and blue band (*NATURE*, vol. xxii, p. 483), proves to belong to the same class as the three stars in Cygnus discovered by Wolf and Rayet in 1867 (*Comptes rendus*, vol. lxv, p. 292). A curious feature of these spectra is that they resemble each other without being identical, the relative brightness of the lines being very different. A further study of them is much to be desired.

Cambridge, U.S., January 24 EDWARD C. PICKERING

#### Zeuglodontia

IN consequence of my letter in *NATURE*, vol. xxiii, p. 54, the sub-editor of the *Graphic* was kind enough to send me the number of that paper containing the engraving of the animal seen from the *City of Baltimore* (not *City of Washington*, as I had misunderstood), and which is that of April 19, 1879. The sketch from which this was taken was sent by Major H. W. J. Senior of the Bengal Staff Corps, with the following description, viz. :-

"On January 28, 1879, at about 10 a.m., I was on the poop deck of the steamship *City of Baltimore*, in lat. 12° 28' N. long. 43° 52' E. I observed a long black object abeam of the ship's stern on the starboard side, at a distance of about three-quarters of a mile, darting rapidly out of the water and splashing in again with a sound distinctly audible, and advancing nearer and nearer at a rapid pace. In a minute it had advanced to within half a mile, and was distinctly recognisable as the veritable 'sea-serpent.' I shouted out 'Sea-serpent! sea-serpent! call the captain!' Dr. C. Hall, the ship's surgeon, who was reading on deck, jumped up in time to see the monster, as did also Miss Greenfield, one of the passengers on board. By this time it was only about 500 yards off, and a little in the rear, owing to the vessel then steaming at the rate of about ten knots an hour in a westerly direction. On approaching the wake of the ship the serpent turned its course a little away, and was soon lost to view in the blaze of sunlight reflected on the waves of the sea. So rapid were its movements that when it approached the ship's wake I seized a telescope, but could not catch a view, as it darted rapidly out of the field of the glass before I could see it. I was thus prevented from ascertaining whether it had scales or not, but the best view of the monster obtainable when it was about three cables' length, that is about 500 yards distant, seemed to show that it was without scales. I cannot, however, speak with certainty. The head and neck, about two feet in diameter, rose out of the water to the height of about twenty or thirty feet, and the monster opened its jaws wide as it rose, and closed them again as it lowered its head and darted forward for a dive,

reappearing almost immediately some hundred yards ahead. The body was not visible at all, and must have been some depth under water, as the disturbance on the surface was too slight to attract notice, although occasionally a splash was seen at some distance behind the head. The shape of the head was not unlike pictures of the dragon I have often seen, with a bulldog appearance of the forehead and eyebrow. When the monster had drawn its head sufficiently out of the water it let itself drop, as it were, like a huge log of wood, prior to darting forward under the water. This motion caused a splash of about fifteen feet in height on either side of the neck, much in the shape of a pair of wings."

The italics in the foregoing and in the account of Capt. Cox are my own.

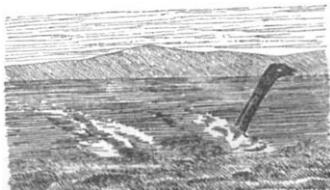


FIG. 1.—The Animal as seen from the *City of Washington*.

The engraving being a large one, of which the foreground is formed by the deck of the steamer, I have copied and send with this that portion of it which shows the animal; and in this it should be observed that besides the splash rising round the neck "like wings," the separate splash at some distance behind the head is also shown, the position of which corresponds to that where the cetacean tail occurs in the figure sent by the captain of the *Kiushiu-maru*, which accompanied my first letter. The foam around the neck, I think, may be due to the splash of the humeroïd paddles which a cetacean should possess.



FIG. 2.—The Animal as first seen from H.M.S. *Dædalus*.

The sub-editor of the *Graphic* has also been kind enough to obtain for me tracings from the three figures given in the *Illustrated News* of October 28, 1848, of the animal seen from the *Dædalus*. From two of these I have made the accompanying reductions to one-fourth (linear) of the originals; and the head portrayed in one of these (as seen when the animal passed close under the stern of the *Dædalus*) is evidently not reptilian, but mammalian; and it seems to bear out the "bulldog appearance of the forehead and eyebrow" which Major Senior describes in his case.



FIG. 3.—Head of the Animal as seen when passing under the stern of the *Dædalus*.

From the *Times* of September 24, 1879, I cut the following notice:—

"Capt. J. F. Cox, master of the British ship *Privateer*, which arrived at Delaware breakwater on the 9th inst. from London, says:—'On the 5th ult., 100 miles west of Brest (France), weather fine and clear, at 5 p.m., as I was walking the quarter-deck, looking to windward, I saw something black rise out of the water about twenty feet, in shape like an immense snake about three feet in diameter. It was about 300 yards from the ship, coming towards us. It turned its head partly from us, and went down with a great splash, after staying up about five seconds, but rose again three times at intervals of ten seconds, until it had turned completely from us and was going from us with great

speed, and making the water boil all round it. I could see its eyes and shape perfectly. It was like a great eel or snake, but as black as coal tar, and appeared to be making great exertions to get away from the ship. I have seen many kinds of fish in five different oceans, but was never favoured with a sight of the great sea-snake before.'"

In this account we have almost a duplicate of that of Major Senior in the dropping of the animal with a great splash into the water prior to its darting forward under it; while the boiling of the water around, which is so inconsistent with the motion of a snake in water (which I have more than once seen) evidently resulted from the strokes of the cetacean tail, and possibly also from those of the paddles, as in the case witnessed by Major Senior. The black colour also is described in both cases.

Capt. Drevar, the statutory declaration of whom and of several of his crew I quoted in my former letter, has written to me, and sent me a printed account (which he says he has circulated) of the conflict which he witnessed, and of the subsequent appearance of the animal rearing its long neck out of the water. This is satisfactory as showing that the declaration I quoted was no hoax, as I feared it might have been; but Capt. Drevar rejects with disdain my suggestion that the animal he saw was not a serpent, though I pointed out to him that nothing having the form of a snake would possess in its submerged portion the buoyancy necessary to enable it to elevate so great a proportion of its length out of water.

Judging from the figures which accompany this and my previous letter, it appears to me that the external form of the animal must resemble the well-known *Plesiosaurus*, if we imagine the hinder (femuroïd) paddles of that *Enaliosaurian* to be absent, and a cetacean tail (which is their homologue), to be present in their stead. Since in the direction of the *Porpoise* the cetacean in external form so closely simulates the fish, so it may in another direction simulate this Mesozoic marine saurian, or the gigantic *Elasmosaurus* of the American Cretaceous formations, of which a nearly perfect skeleton is described by Prof. Cope as forty-five feet in length, the neck constituting twenty-two of this length.

Whether, through your circulation, any light on this subject, so far as the character of the skeleton of *Zeuglodon cetoides* is concerned, may be forthcoming from American palaeontologists remains to be seen; but there ought, I submit, to remain no longer with naturalists any doubt that a hitherto unknown group of carnivorous cetaceans, with necks of extraordinary length, inhabit the ocean.

It seems to me also most probable that the conflicts which have been so often witnessed (and which Mr. Pascoe in his letter in NATURE, vol. xxiii. p. 35, says he himself twice witnessed), and referred to the Thresher, have been attacks by the animals in question upon whales.

SEARLES V. WOOD

Martlesham near Woodbridge

#### Ice Intrusive in Peat

I HAVE just returned from a walk on the shore at Crosby, where I have been much interested in observing one of the effects of the late severe frost combined with the present thaw.

At the Alt Mouth is a submarine peat-and-forest-bed, and, lying over it, I was much surprised to see innumerable slabs of peat, which an examination showed in most cases contained interlaminations of ice. One slab measured 5 yards by  $2\frac{3}{4}$  yards by about 8 inches thick, and right through its mass in a parallel plane with the surface, separating the peat into an upper and lower layer, was a slab of transparent ice, wedge-shaped, being 4 inches thick at one side, diminishing to 1 inch at the other. How the ice got there was the surprising thing, as the peat is very hard and compact, and about 18 inches thick. The holes or places from which the sea had quarried these frozen slabs were plainly to be seen, and I noticed round one of them that the edges or lips of the peat had been forced up by ice inserting itself between the laminae.

A good deal of water ordinarily oozing through the sandhills flows or trickles over the surface of the peat, and as nearly six inches of rain fell in December last, and the two previous months were wet, the quantity of water would be abnormally increased. In some way or other it must have percolated along the peaty laminae, and by gradual accretion the frozen water has forced up the layer of peat above it. This has occurred at neaps, and the late high tides, assisted by the thaw and the decreased specific gravity of the mass, has lifted the frozen slabs of peat and